TRUSSING POULTRY

The present invention relates to a food-product truss, particularly though not exclusively, for binding the legs of a bird together.

It is desirable to truss or bind the legs of a bird or fowl together before cooking. This provides the bird with an attractive appearance, making the bird more appealing to customers at the point of sale.

Traditionally, trussing is performed manually using an elastic band or twine to truss the legs to the tail. The process, however, is labourious, time-consuming (because only about 2 or 3 birds can be trussed per minute) and leaves operators vulnerable to repetitive strain injury.

A further disadvantage is that materials traditionally used for trussing such as twine and rubber are inedible. Food regulations may also require the product to be additionally labelled to warn consumers of the presence non-edible materials.

It is an object of the present invention to provide an edible truss which may be applied by a semi-automated process to bind the legs of a bird together.

According to a first aspect of the present invention, there is provided a truss for binding the legs of a bird together, the truss being formed of an edible material and applied above the hocks of the bird such that the hocks are crossed and the legs are held together against the breast of the bird with the hocks in proximal but spaced relation to the tail of the bird.

The truss is preferably formed from an edible composite material comprising one or more of the following materials: collagen, cellulose and alginate.

Preferably, the truss is formed of a material which is chicken-skin coloured.

In one embodiment, the truss is formed of flattened collagen (sausage) casing which is slit to form films or ribbons, and which may thereafter be twisted. The slit

casing may simply be folded or plaited to provide a multiple-layer film or ribbon, typically two layers or four layers. Of course, such films or ribbons may also be made by folding collagen or similar flat sheets (as distinct from slit tubular casings).

By way of example the truss may be formed from a film or ribbon comprising 5 parts collagen, 2 parts glycerol, 2 parts water and 1 part cellulose. Conveniently such a film or ribbon is preferably twisted to provide between 75 and 110 twists per metre. Alternatively the truss may be formed from a film or ribbon comprising 3 parts collagen, 2 parts glycerol, 2 parts water and 1 part cellulose and which is preferably twisted to provide between 15 and 50 twists per metre.

Advantageously, the truss is maintained in position and in close contact throughout its length with the moist surface of the bird. This prevents the truss from becoming dry and/or brittle during cooking. A basting oil or lubricant (e.g., sunflower oil) may be applied to the truss prior to tying and cooking. Conveniently, the truss is formed of a material which, on cooking, becomes crisp, turns a golden colour and absorbs the full flavour of the cooked bird.

The truss may be applied as a single loop but is preferably applied as a double loop. Advantageously, the truss is knotted as an overhand knot positioned between the hocks of the bird.

The truss of the present invention provides the bird with a symmetrical appearance, making the bird attractive to customers at the point of sale. The legs of the bird are held securely together by applying the truss above the hocks. The truss also gives the bird a more natural conformation as is seen in a chef's presentation and ensures that the legs are held in a position close to the keel of the bird. This minimises the risk of "tenting " i.e. the unsightly appearance of taut skin between the breast and thigh, leading to skin splitting.

In the chef's presentation the bird presents in a natural supine posture, with wings tucked in the usual way. There is no significant asymmetry in the legs or body, as is commonly seen with the use of elastic or side-insertion (stab and tuck) trussing. In the latter case, legs are frequently skewed or splayed, leading to asymmetry in the body and a more variable, inferior merchandising appearance. In the latter case also, where the elastic is passed around the body, (and often the wings and legs as well) the bird is invariably contorted and foreshortened, with consequent loss of natural conformation and consistency in presentation.

By positioning the legs close to the breast of the bird, the breast of the bird is provided with a plump and high appearance. The close proximity of the legs to the breast also ensures that the breast meat remains moist after cooking. These advantages are achieved without including the tail in the truss.

According to a second aspect of the present invention there is provided a method of trussing the legs of a bird together to form a food product, the method comprising the steps of:

positioning the legs of the bird close against the breast of the bird,

arranging the hocks of the bird in a crossed configuration,

applying a truss formed of an edible material above the hocks of the bird such that the hocks are held together against the breast of the bird and in proximal but spaced relation to the tail of the bird.

Preferably, the method further comprises the step of tying the truss with an overhand knot positioned between the hocks of the bird.

Once trussed, the birds may be pumped and/or cartonised. During cartonisation, it is advantageous to ensure that rigor mortis is achieved with the legs of the birds against the breast. Thus, the birds are preferably

arranged with their legs downwards, with adjacent birds supporting each other during transit.

The method of the present invention may be used to truss the legs of a bird tightly together, allowing the bird to be loaded into an oven or combi-steamer by automatic means. For example, the birds may be positioned in an oven by an epigastric vent without fear of the truss becoming detached from the bird.

These and other aspects of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a food-product truss in accordance with a preferred embodiment of the present invention;

Figure 2 is an enlarged view taken from a different angle of the region labelled A of Figure 1;

Figure 3 is a perspective view of an operator applying the truss of Figure 1 by a semi-automatic device; and

Figure 4 is a view of a detail of the Figure 3 device.

Reference is first made to Figures 1 and 2 which depict a food-product truss 10 applied above the hocks 12 of a chicken 14. The truss 10 is applied as a single or double loop around a region above the hocks 12 and is secured by an overhand knot 16.

The truss 10 is maintained throughout its length in close contact with the moist surface of the chicken 14. This prevents the truss 10 from becoming dry and brittle during cooking.

The hocks 12 are positioned in a crossed configuration, and are centrally located a small distance above the tail 18 of the bird. Thus, the upper legs 20 of the chicken 14 are held firmly against the chicken's breast 22, providing the breast 22 with a high and plump appearance. The close contact between the legs 20 and breast 22 of the chicken 14 also prevents the chicken meat from drying-out during cooking.

Thus trussed, the chicken 14 has a symmetrical

appearance, making the bird 14 more attractive to customers at the point of sale.

Reference is now made to Figure 3 of the drawings which depicts an operator applying the truss of Figure 1 to a chicken 14 using a trussing machine 100 which enables about 10 to 15 birds per minute to be processed.

The trussing machine 100 comprises a tying deck 110 and a tying or binding head 111 access to which is guarded by guard 113 having an orifice 112 which is adapted to receive the lower leg portions or hocks of a chicken. When the legs of the chicken are positioned within the orifice 112 accordingly, a truss is applied automatically as a double loop around a region above the hocks and secured by an overhand knot (not shown).

To apply the truss, a chicken 14 is positioned on the tying deck 110 with the upper legs held closely to the breast and one hock of the chicken crossed beneath the other.

Once the truss is applied, the chicken 14 is removed from the orifice 112 and pumped and cartonised, as required. The birds are preferably cartonised such that the legs are maintained in close proximity to the breast and are then set by rigor.

To assist in this operation a guide 116 shown in Figure 4 is secured to the deck 110 and functions as a stop to limit penetration of the bird into the machine 100 and at the same time holds the crossed hocks in the crossed position whilst the single or double truss loop(s) is applied by the binding head 111. The guide 116 is formed of a main member 117 which is secured at its base 117A by bolts 118 to the deck 110. The exact position of member 117 relative to the orifice 112 is adjustable by the provision of slotted holes in the member 117. The member 117 is plate-like standing on edge and on either side elongate members 120A and 120B are located being secured by transverse bolts 121, 122. Bolts 121, 122 pass through slotted holes in member 117 enabling members 120A, 120B to

be set at an angle to the base 117A of member 117. Each member 120A, 120B in turn carries a respective stop element 123A, 123B which is of L-shaped cross-section and which is adjustable towards and away from the orifice 112.

The guide 116 is arranged to receive the crossed hocks such that one hock end lies on either side of member 117 and below members 120A, 120B and in abutment with elements 123A, 123B.

The guide 116 is adjustable to accommodate birds of different sizes but it will be understood that normally only one size at a time is trussed.

Certain characteristics of the truss will now be described in further detail with reference to the following examples.

Example 1

In this example, eighty number 12 chickens were trussed in accordance with the preferred embodiment of the present invention. Once trussed, the chickens were pumped according to standard supermarket specifications. The truss ensured that the chicken legs were bound securely together: only one leg became detached during pumping.

Example 2

In this Example, twenty of the birds of Example 1 were lifted by their legs and loaded into an oven for roasting. The trusses were resistant to damage: all the trusses remained intact during handling.

The birds were placed in the oven for a 60 minute cook cycle. A core temperature of above 86°C was achieved.

Once cooked the birds had a crisp, golden appearance.

Example 3

The appearance of the birds of Example 2 were graded using a method based on a scale of 1 to 3. Grade 1 chickens were found to be most attractive to consumers, and Grade 3 chickens, were found to be the least attractive. The scale was derived from the six parameters listed below.

(I) How close are the thighs or legs to the breast?

(II) How plump and high does the breast appear?

(III) How close are the legs to the tail?

(IV) Is there any tenting (i.e. unsightly taut skin between the breast and leg, leading to skin splitting)?

(V) Are the hocks crossed?

(VI) Is the plug visible?

Grade 1 chickens had (I) thighs which were held tightly to the breast, (II) a high plump breast, (III) legs which were held close to the tail, (IV) no tenting or splitting, (V) crossed hocks and (VI) no sign of the plug.

Grade 2 chickens had (I) thighs spaced slightly apart from the breast, (II) a moderate plump breast, (III) legs which were not held closely to the tail, (IV) some tenting but no splitting, (V) hocks which were adjacent but not crossed, and (VI) an invisible or partially visible plug.

Grade 3 chickens had (I) thighs splayed apart, and/or (II) a flat breast, (III) legs askew and positioned significantly apart from the tail, (IV) pronounced tenting and/or skin splitting, (V) hocks which were not touching, and/or (VI) a clearly visible and protruding plug.

The grades which were awarded to the chickens of Example 2 are listed in Table 1 below.

Table 1

Grade 1 (good)	Grade 2 (average)	Grade 3 (poor)
19	1	0

Comparative Example 1

Eight birds were trussed by traditional methods, using an elastic band to bind the legs of the bird to the tail. These birds were subjected to the same handling and cooking conditions as Example 3 above. The cooked birds were graded using the grading method of Example 3 and the results are shown in the Table 2 below.

Table 2

Grade 1 (good)	Grade 2 (average)	Grade 3 (poor)
3	4	1

A comparison of the results of Tables 1 and 2 shows

how chickens trussed by the present invention are more attractive to consumers than chickens which are trussed by traditional methods.

Example 4

In this example, twenty birds were trussed in accordance with the preferred embodiment of the present invention. These birds were subjected to extensive jostling and handling before being loaded into a CONVOTHERM oven for roasting. The trusses showed resistance to damage during the handling and loading procedure.

The birds were cooked using a 70 minute cook cycle, and a core temperature of approximately 85.2°C was achieved.

Nineteen out of the twenty trusses were resistant to the high oven temperatures and remained intact throughout the cooking process.

The birds were graded using the method of Example 3 above. The results are shown in Table 3 below.

Table 3

Grade 1 (good)	Grade 2 (average)	Grade 3 (poor)
18	1	1

Comparative Example 2

Twenty-seven chickens were trussed by traditional methods using an elastic band to bind the legs of the bird to the tail. These chickens were subjected to identical handling and cooking procedures as the chickens of Example 4 above. The chickens were graded in accordance with the method of Example 3 and the results are shown in Table 4 below.

Table 4

Grade 1 (good)	Grade 2 (average)	Grade 3 (poor)
11	11	5

A comparison of Tables 3 and 4 confirms that chickens trussed by the present invention have better display characteristics and are more attractive to consumers than

chickens which are trussed by traditional methods.

Various modifications may be made to the above described embodiment without departing from the scope of invention. For example, the truss 10 may be applied to any type of bird irrespective of size and configuration.